

USE OF AGRICULTURAL LAND CATEGORIES IN EU COUNTRIES

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Abstract: In the introductory part, the authors deal with the importance of agricultural lands, its effect on water management, use of land in agriculture, the influence on the climatic conditions and the whole Earth's ecosystem, examining the system from the perspective of Czech accounting and IFRS. In the working part, the authors focus on the comparison of the state of used agricultural land in thousands of ha in the EU countries by individual categories using historical statistical data from Eurostat on the quantity and structure of used agricultural land. The authors present relevant time series in tables and graphs; the comparison of categories of land in individual EU countries was presented in the form of graph. There was made a comparison of individual EU countries by the size of used agricultural land per one inhabitant. In the conclusion part, trend function calculated for all EU countries is used to make prediction for individual categories of agricultural land for the year 2020.

Keywords: agricultural land, EU countries, categories of land, arable land, grassland, permanent grassland, prediction.

1 Introduction

The total area of the agricultural land fund in the CR as of 31 December 2017 was 4,205,288 ha, which accounts for 53.32% of the overall area of the land fund of the CR. To this date, the area of arable land was 2,958,603 ha (37.5% of the overall area of the land fund), in the case of hop gardens, it was 10,066 ha, 20,008 ha for vineyards, 164,815 ha for gardens, 45,245 ha for orchards, and 1,006,552 ha for permanent grassland (meadows, pastures). The area of forestry land was 2,671,659 ha (33.9% of the overall area of the land fund), water bodies 166,253 ha, build-up areas and courtyards 132,333 ha. Other areas occupied 711,464 ha; however, the amount of the land used for agricultural purposes is smaller.

Act No 334/1992 Sb. (Czech Republic, 1992a) on the Protection of Agricultural Land Fund governs the protection of the land in the Czech Republic, stipulating that the agricultural land fund involves the fundamental natural heritage of our country, irreplaceable means for production and one of the essential components of the environment. It comprises cultivated lands (arable land, hop-fields, vineyards, fruit orchards, gardens, meadows and pastures) and temporarily barren land, fish or waterfowl breeding ponds, barren land necessary for agricultural production (dirt roads) irrigation water tanks, anti-erosion terraces etc. The Act governs that the non-agricultural purposes should primarily use barren land (building gap sites etc.) (Slábová, 2006). Unfortunately, today's practices incline to break this law, leading to building public and private structures mostly on the agricultural land. Most parts of the total area do not enjoy adequate cultivation regarding the size of the individual fields, not providing separation by ever-green baulks that would form vital bio corridors for ecological stability.

Devising large-area systems resulted in mutually unconnected small-sized woods. The technology of up-to-date agriculture is not eco-friendly and poses a high risk of damaging the environment (Gremlica et al., 2002).

The agricultural land mostly involves arable land (fields), meadows and pastures, fruit orchards, vineyards and hop fields. Arable land refers to an area for growing crops. The article aims at analysing the current structure of used agricultural land in the EU countries by comparing historical data and revealing the necessity for a continuous change in the system and composition of the land. The Eurostat data will also determine linear trend functions for individual EU countries and all basic categories of

cultivated land to predict values of respective time series for the year 2020.

2 Literature research and used data and methods

Soil is the outermost layer of the Earth's crust, consisting of water, air, regolith, organic matter and living organisms. It originates from the transformation of inorganic and organic substances, serving as a natural habitat of fauna and flora, and ceases to exist by erosion. Soil evolves very slowly; one-centimetre Earth's crust can form up to hundreds of years. Humanity has always depended on cultivating soil as it has been a source of food and various non-productive and ecosystem functions.

Soil enables plant growth, retains and uses water, contributes to the hydro-thermal balance of the atmosphere, regulates gas exchange between land and atmosphere, allows nutrient and substance exchange, contributes to the environment, covers the Earth and provides the place for building.

Although the global population may use roughly 87 million km² of land, the human factor has irreversibly damaged its substantial part, which led to its degradation. Urban areas have the most profound influence on the evolution of soil and its quality. The soil decline and destruction mean a big problem for humanity, unfortunately leaving politicians and other important persons unconcerned.

People often have no other but to harm the nature from, sometimes allegedly, economic necessity. As an example may serve a situation when poor peasants in Brasil have been burning down tropical rainforest to raise soya and breed livestock. It is, unfortunately, the general philosophy of today's consumer society (CSO, 2018).

The truth is that a human being substantially contributes to the soil degradation, removing natural vegetation (mostly for building reasons), mining, dumping or harmfully cultivating (monocultures, excessive spraying, lack of organic matter, using heavy mechanisms etc.). These bad practices have penetrated on a global scale – developing and developed countries. As humanity has dismally failed to use the land carefully and efficiently, the soil is subject to bit-by-bit degradation and prevented from expanding, leading to mortal danger of the human species (Šimek et al., 2019).

What poses the essential global issue is soil desertification (transforming fertile land into the barren desert), disintegrating social systems and causing migration from the affected territory. In 1992, the OSN introduced the Convention to Combat Desertification to the countries stricken by severe drought or desertification. The treaty aims to provide humanitarian aid in afflicted territories – mostly in Africa. The Convention came to force in 1996; the CZ ratified the agreement in 2000 (Slábová, 2006).

Yet, we need to say that large international organizations have not seriously dealt with the issue of soil degradation, which is the biggest threat to this essential constituent of the environment. No sooner than in 2015 did the OSN summon the General Meeting to tackle this problem, assessing the Earth's crust condition. Document Status of the World's Soil Resources employed about 200 scientists from 60 countries, including the Czech Republic. The analysis considers erosion and expanding built-up areas in Europe as the fastest growing menace (Protection of the Nature, 2020).

Europe is a continent that strongly depends on the land outside its territory. The land area of the EU is about 640 million hectares per year, i.e. 1.5 times more than the overall size of all member countries. The Czech Republic uses another 18,500 km² outside its borders, i.e. roughly 44% of its agricultural land, not

including consumption of raw materials such as cotton, metals etc. The average EU member uses about 1.3 ha of land per year, which is six times more than the total population of Bangladesh. Such an insatiable European demand for land has a massive disastrous impact on the environment, politics and social life (Soil Atlas, 2018).

The Czech Republic currently faces severe drought, fundamentally caused by deforestation, destroying groves and concreting the landscape. The intense water drain from roofs, industrial areas, public places and roads straight to the sewerage (the whole procedure does not include water-accumulating land) and temperature rise involving increased water vapour currently pose enormous problems.

The soil in the Czech Republic has lost the ability to soak and retain water, as heavy downpours wash away its most fertile layer. Approximately 20 million tonnes of arable land disappear every year, thus reducing its capacity to preserve water equal to 6 millions m³ of water per year, which is total consumption of roughly 130,000 people (De Luce, 2020).

Soil constitutes an integral part of the environment with a large scale of functions – multifunctionality, which involves, in terms of human needs, three groups: utility, environmental and cultural. The utility function serves as an essential production tool in agriculture and forestry, giving rise to crops and forest fruits, produces a space for human activities (housing, recreation, life etc.), economic use (constructions, infrastructure, dumping etc.) and provides invaluable natural resources.

From all kinds of erosion, water erosion presents the deadliest threat to the land in the Czech Republic. Due to the intensified agricultural production in the past, the Czech Republic has the hugest land blocks in Europe, which only leads to even more severe water erosions. National land redistribution involved massively removing hydrographic and other landscape elements, destroying baulks, grassing valley lines, dirt roads, liquidating luxuriant vegetation that effectively reduced rapid erosion. (Ministry of Agriculture, 2018).

Soil sealing directly relates to uncontrolled sprawling (suburbanization) and currently, together with erosion, poses an enormous problem to agricultural land. Soil sealing means covering the area with impermeable materials, causing that the soil loses its natural properties and is unable to perform its essential functions. What brings about soil sealing is relatively low plot prices, when investors prefer building on a greenfield rather than using built-up city area or renovating older buildings (brownfield). (Ministry of Agriculture, 2018).

The recent decades have seen intense pressure on exempting agricultural lands from the land fund with the prospect of subsequent development. This step is, however, irreversible, because it prevents our society from a commodity of ever-increasing value (Polanecký et al., 2018).

Doc. Hruška from Global Change Research Institute of Academy of Science claims that industrial agriculture uses large amounts of artificial fertilizers and pesticides (in the event of the CZ, the situation applies to vast fields without ecological elements such as baulks, meadows, wetlands and alleys), leading to the loss of biodiversity and water contamination caused by nitrogen-pesticides chemical compounds. Industrial agriculture as such shall thereby not draw on public funds due to its unsustainability and damage caused to the public property. Based on this situation, renowned scientists (coordinated by Dr Guy Pe'er from German Centre for Integrative Biodiversity Research iDiv in Leipzig) appeal in People and Nature Magazine to the European Parliament, member states of the EU and the European Commission to adopt ten emergency measures aiming at sustainable food production, preserving biodiversity and mitigating climatic changes (Czech Society for Ornithology, 2020).

The Civil Code defines the land as real property, and according to Czech accounting, regulations shall be reported and evaluated

independently with no possibility of depreciation. The plot involves areas not only above but also beneath the surface, including constructions built on the land, subject to temporary structures and vegetation on the parcel. The building parcel does not comprise engineering networks (water pipelines, sewerage, power networks etc.). The buying party shall divide the purchasing price into a part relating to building and concerning the land parcel. What applies here is the proportional distribution provided by an expert and a professional evaluation of the land using, e.g. price maps (Ryneš, 2019).

Lands are always long-term tangible assets irrespective of valuation unless sold as a commodity. The valuation involves forest grasslands and trees and bushes not integrated into the cultivation of permanent vegetation.

The accounting and tax viewpoint also draws a line between the land and the parcel. The land refers to the Earth's surface detached from neighbouring parts by a boundary of administration unit or boundary of cadastre unit, real property boundary, possession, land type etc. The parcel means a land determined by a planimetric survey point and depicted and designated by a land parcel number in the cadastral map.

The land can be bargained by purchase, gratuitous acquisition, deposit from another person, or transferred pursuant to the effective legislation, or transferred from private enjoyment to business purposes. The accounting case is discharged as of the date of the delivery of the proposal for filing to the cadastre. (Sagit, 2020)

International Accounting Standards IAS 16 define lands as tangible assets held by the accounting unit for uses in the production, supplying or services, so that they could be rented to other persons, or for administrative purposes for enjoyment in the duration of exceeding one period. Lands recognized as assets are evaluated through purchase costs, including the purchasing price and taxes. Lands of which the real value can be precisely determined after the recognition are reported in the revaluated amount that complies with the real value to the date of the revaluation after deducting accumulated losses from the reduced value. Revaluation should be performed on the regular basis, so that the accounting value is not significantly different from the real value, determined at the end of the accounting period. The real value of the land is usually calculated from the market price recommended by a qualified expert (Oswald, 2020). VAT Act does not explicitly define term 'land', only stating that pursuant to the cadastral law, the land refers to an Earth's surface sector limited by means listed in the real property cadastre. The boundaries are either natural, or made by a human. The Civil Code defines the land as a land recorded in the real property cadastre with allocated land parcel number.

Lands in the territory of the Czech Republic recorded in the real property cadastre are liable to the property tax, subject to lands composed of protective woods and special-purpose woods or lands used for the protection of the CZ (Czech Republic, 1992b). The analytical part examines historical data comparing the structure of the currently used agricultural land according to categories within individual EU countries and throughout the European Union. Specific member states of the EU are explored in terms of their average value UAA per inhabitant. Calculated linear trend functions predict agricultural activities regarding land categories for all member states of the EU and, also, the total sum for the whole EU.

The applied statistical tools involve tables, diagrams and charts of descriptive statistics and intermediate time series resources. Calculations suggested in tables and diagrams were elaborated by Excel Program (Chajdiak, 2013, Stuchlý, 2015).

3 Results

Immediate time series represent historical data on the size, structure and development of the used agricultural land. The analyses thereby involve conventional methods of calculating and interpreting some of the numeral characteristics of time series

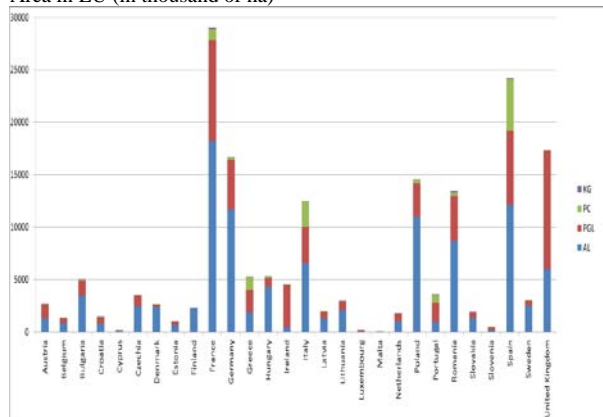
and their average values, depicted or illustrated in tables and charts. Eurostat collects data on the structure and development of Utilized Agricultural Area by Categories in 2007–2018 in EU countries in thousands of ha. The Utilized agricultural area (abbreviated as UAA) describes the area used for farming. It includes the following land categories: arable land (AL); permanent grassland (PGL); permanent crops (PC); other agricultural land such as kitchen gardens (KG) even if they only represent small areas of total UAA. The term does not include unused agricultural land, woodland and land occupied by buildings, farmyards, tracks, ponds, etc. Table 1 and Figure 1 comprise up-to-date data on general categories of agricultural land from the last season of 2018.

Table 1. Up-to-date general categories of the used agricultural land in thousands of ha in EU countries in 2018

Land	UAA	AL	PGL	PC	KG
Austria	2653.84	1327.15	1258.81	66.87	1.02
Belgium	1356.08	856.83	479.64	19.62	0
Bulgaria	5030.28	3463.67	1399.04	152.73	14.84
Croatia	1485.65	803.9	607.56	72.34	1.85
Cyprus	131.94	104.3	1.59	26	0.05
Czechia	3523.22	2489.99	990.09	42.35	0.78
Denmark	2632.5	2389.8	212.7	30	0
Estonia	1004.21	679.15	311.76	4.1	9.19
France	29020.16	18229.91	9593.99	1044.79	151.48
Germany	16645.1	11730.9	4713.4	199.4	1.4
Greece	5288.05	1849.64	2171.27	1258.8	8.34
Hungary	5343.78	4333.7	799.28	173.37	37.43
Ireland	4516.04	449.94	4064.21	1.88	0
Italy	12484.98	6544.69	3482.73	2425.52	32.04
Latvia	1937.9	1294.8	634.8	8.3	0
Lithuania	2947.23	2113.28	794.97	31.07	7.91
Luxembourg	131.56	62.28	67.71	1.56	0.01
Malta	11.58	9.23	0	1.27	1.08
Netherlands	1822.4	1020.79	763.79	37.82	0
Poland	14539.55	11009.21	3149.87	352.57	27.9
Portugal	3591.42	919.18	1876.94	778.96	16.33
Romania	13413.74	8685.63	4288.41	341.06	98.64
Slovakia	1919.54	1347.77	523.55	17.52	30.7
Slovenia	477.93	172.98	277.17	27.78	0
Spain	24201.91	12125.53	7037.37	4924.94	114.07
Sweden	3000.39	2541.99	455.14	3.25	0
United Kingdom	17357	6044	11277	36	0
EU	178739.9	104842.84	61256.89	12083.27	556.86

Source: Eurostat (2020).

Figure 1. Actual Values (in year 2018) of Utilized Agricultural Area in EU (in thousand of ha)

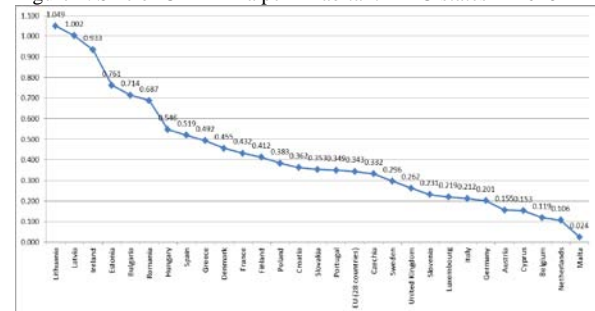


Source: Authors.

The suggested data on individual EU countries represent time series reflecting the condition of the used agricultural land in thousands of ha in 2018. Largest countries (France, Spain, Great Britain and Germany) show the highest values of the used agriculture land; on the other hand, small states (Malta, Luxembourg, Cyprus and Slovenia) indicate the lowest rates. The CZ enjoys 3,523.22, Slovakia 1,919.54 and the whole EU 178,739.88 thousands of ha of agricultural land.

Upon analysing data about the population in EU countries (Eurostat, 2018), we can compare EU countries according to the average size of UAA per inhabitant in 2018. Figure 2 suggests the results.

Figure 2. Size of UAA in ha per inhabitant in EU states in 2018



Source: Authors.

Countries with higher UAA/inhabitant values (in ha per inhabitant) heavily focus on agricultural production (Lithuania 1.049 and Latvia 1.002), as contrasted to states with lower UAA/inhabitant rates, which are either smaller, or more concerned with industry (Malta 0.02, The Netherlands 0.11, Belgium 0.12). The CZ reflects the average value 0.33, Slovakia 0.35 and the EU as a whole 0.34 ha/inhabitant.

Owing to a different size of individual nations, a method of relative percentage breakdown is more suitable to identify individual land categories from the overall used agricultural land (see Table 2 and Figure 3).

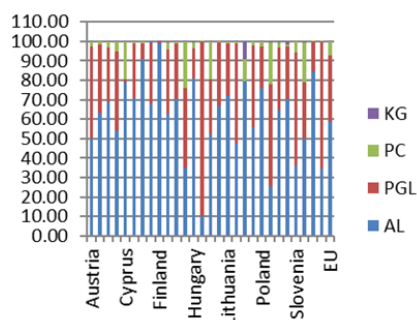
Table 2. Distribution of general categories of the used agricultural land in 2018 (in % from UAA) in EU countries

Land	AL	PGL	PC	KG
Austria	50.01	47.43	2.52	0.04
Belgium	63.18	35.37	1.45	0.00
Bulgaria	68.86	27.81	3.04	0.30
Croatia	54.11	40.90	4.87	0.12
Cyprus	79.05	1.21	19.71	0.04
Czechia	70.67	28.10	1.20	0.02
Denmark	90.78	8.08	1.14	0.00
Estonia	67.63	31.05	0.41	0.92
Finland	98.71	1.06	0.15	0.08
France	62.82	33.06	3.60	0.52
Germany	70.48	28.32	1.20	0.01
Greece	34.98	41.06	23.80	0.16
Hungary	81.10	14.96	3.24	0.70
Ireland	9.96	89.99	0.04	0.00
Italy	52.42	27.90	19.43	0.26
Latvia	66.81	32.76	0.43	0.00
Lithuania	71.70	26.97	1.05	0.27
Luxembourg	47.34	51.47	1.19	0.01
Malta	79.71	0.00	10.97	9.33
Netherlands	56.01	41.91	2.08	0.00
Poland	75.72	21.66	2.42	0.19
Portugal	25.59	52.26	21.69	0.45
Romania	64.75	31.97	2.54	0.74

Land	AL	PGL	PC	KG
Slovakia	70.21	27.27	0.91	1.60
Slovenia	36.19	57.99	5.81	0.00
Spain	50.10	29.08	20.35	0.47
Sweden	84.72	15.17	0.11	0.00
United Kingdom	34.82	64.97	0.21	0.00
EU	58.66	34.27	6.76	0.31

Source: Authors.

Figure 3. Classification of individual categories of agricultural land in EU countries (in % of UAA)



Source: Authors.

Finland (98.71%), Denmark (90.78) and Hungary (34.82%) have the largest area of arable land; on the other hand, Ireland (9.96%), Portugal (25.59%), The United Kingdom (34.82%) shows the lowest numbers of the respective land. The area of the CZ is 70.67%, Slovakia is 70.21 and the whole EU amounts to 58.66%.

The largest proportional grassland area is in Ireland (89.99%), The United Kingdom (64.97%) and Slovenia (57.99%), while the smallest proportion involves Malta (0%), Finland (1.06%) and Cyprus (1.21%). The grassland area of the CZ is 28.10%, Slovakia 27.27% and the EU 34.27%.

The largest proportional area of permanent crops is in Greece (23.80%), Portugal (21.69%) and Spain (20.33%), whereas the smallest proportion falls to Ireland (0.04%), Sweden (0.11%), and Finland (0.15%). The area of the CZ is 1.20%, Slovakia 0.91% and the EU 6.76%.

The largest proportional area of kitchen gardens is in Malta (9.33%), Slovakia (1.60%) and Estonia (0.92%), while no kitchen gardens exist in Belgium, Denmark, Ireland, Latvia, The Netherlands, Sloveni, Sweden and The United Kingdom. The area of kitchen gardens in the CZ is 0.02% and the EU 0.31%.

Historical data from Eurostat website for 2020 involve linear trend functions of the intermediate value prediction of individual time series according to all categories of the used agriculture land for all EU countries and their summarized values. If data tables lacked some values, trend functions employed only a specific continuous time series (including without limitations kitchen gardens category). Table 3 compiles the predictions, including The United Kingdom, which is not a part of the EU any longer and as such its values can be deduced from the total.

Table 3. Predictions of values of the general categories comprising the used agricultural land in 2020 (in thousands of ha) in EU countries by the linear trend

Land	UAA	AL	PGL	PC	KG
Austria	2448.96	1321.05	1062.18	65.99	0.14
Belgium	1327.66	841.76	468.95	18.11	0.00
Bulgaria	4987.34	3661.77	1192.57	122.66	11.42
Croatia	1561.09	821.88	670.47	68.34	1.61
Cyprus	113.32	89.35	1.61	22.33	0.05

Land	UAA	AL	PGL	PC	KG
Czechia	3480.92	2444.96	993.11	42.42	0.43
Denmark	2611.69	2353.72	220.99	37.08	0.00
Estonia	1032.31	703.44	316.39	4.00	8.50
Finland	2267.98	2204.30	23.40	2.98	1.60
France	28295.88	17972.69	9183.33	1006.68	139.98
Germany	16567.53	11734.42	4631.18	201.32	0.61
Greece	5564.31	1895.99	2330.80	1326.39	7.30
Hungary	5140.91	4257.27	679.65	166.97	16.49
Ireland	4484.86	453.83	4029.51	2.18	0.00
Italy	12686.08	6423.69	3117.51	2476.62	26.63
Latvia	1953.75	1306.22	640.55	7.03	0.00
Lithuania	3073.69	2296.54	736.07	33.17	7.92
Luxembourg	131.40	62.81	67.03	1.54	0.01
Malta	12.20	9.66	0.00	1.24	1.31
Netherlands	1774.44	1021.01	717.08	38.41	3.88
Poland	13960.52	10453.55	3116.80	382.85	25.27
Portugal	3616.98	918.27	1902.46	782.19	14.06
Romania	13534.25	8626.15	4498.39	309.64	100.07
Slovakia	1913.32	1351.10	515.16	15.29	29.31
Slovenia	473.84	171.99	273.65	28.21	0.00
Spain	23476.17	12145.20	6475.90	4770.20	114.06
Sweden	2980.70	2532.54	442.01	3.59	0.00
United Kingdom	17191.58	6097.18	11054.28	37.23	0.00
EU sum	176663.69	104172.32	59361.02	11974.68	510.65

Source: Authors.

The largest share from the category of the used agricultural land includes arable land and permanent grassland. In most countries, kitchen gardens involve time series indicating a lot of missing values. The most extensive use of arable land is the most evident in France (about 18 mils. ha) and Spain (about 12.1 mils. ha). The grassland is again the most predominant in France (roughly 9.2 mils. ha) and Spain (6.5 mils. ha), disregarding Great Britain. The CZ enjoys about 2.4 mils. ha of the used arable land and approximately 1 mil. ha of grassland. The total number in the whole EU amounts to roughly 98 mils. ha of the used arable land and about 48.3 mils. ha of grassland.

4 Conclusions

The article aimed at comparing the current situation (in thousands of ha) of the used agricultural land in 2007–2018 in individual EU countries (and the whole EU) regarding the respective classification. The analysis involved the comparison of specific EU countries according to the average value of the used agricultural land in ha per inhabitant. The final table suggests predictions of categories of the used arable land for 2020 in all EU countries, based on the linear trend of separate time series.

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